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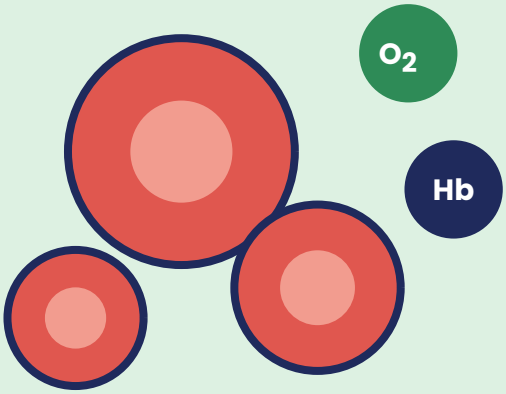
Year 10–11 • GCSE & IGCSE Biology

Blood and its Components



Exam-Style Worksheet

Recall, topic and exam-style questions on plasma, red and white blood cells, platelets, clotting and microscopy.

Plasma | Red cells | White cells | Platelets | Clotting | Microscopy

KEY IDEAS IN THIS WORKSHEET

YEAR 10–11

Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Section A	Recall: multiple choice, gap fill, true/false, matching	**33 marks**
Section B	Topic questions: plasma, cells, clotting, microscopy	**59 marks**
Section C	Exam-style questions (GCSE / IGCSE)	**46 marks**

Instructions

- Answer all questions in the spaces provided.
- Show your working in calculations.
- Marks for each question are shown in [ ].
- Section C is in the style of GCSE / IGCSE papers.

Total score

/ 138

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Blood and its Components Worksheet

Year 10–11 • GCSE and Cambridge IGCSE Biology • Recall, topic and exam-style questions.

Section A Recall [33 marks]

A1 Multiple choice – write the letter of the correct answer in the box. **[12]**

1. Which part of the blood makes up about 55% of its volume?
A Red blood cells **B** Plasma **C** Platelets **D** White blood cells

2. Which of these is **not** dissolved in plasma?
A Urea **B** Glucose **C** Haemoglobin **D** Carbon dioxide

3. What is the function of haemoglobin?
A Digests pathogens **B** Binds to oxygen **C** Forms clots **D** Makes antibodies

4. Why do red blood cells have no nucleus?
A To divide faster **B** To make antibodies **C** More room for haemoglobin **D** To store glucose

5. Which cell has a lobed nucleus?
A Phagocyte **B** Lymphocyte **C** Red blood cell **D** Platelet

6. What do lymphocytes produce?
A Fibrin **B** Haemoglobin **C** Antibodies **D** Urea

7. Platelets are best described as…
A Whole cells **B** Fragments of cells **C** Proteins **D** Hormones

8. During clotting, which soluble protein is changed into fibrin?
A Haemoglobin **B** Antitoxin **C** Fibrinogen **D** Insulin

9. Where are red blood cells made?
A Liver **B** Kidneys **C** Heart **D** Bone marrow

10. The biconcave shape of a red blood cell increases its…
A Mass **B** Surface area to volume ratio **C** Number of nuclei **D** Lifespan

11. What is the job of an antitoxin?
A Neutralises toxins **B** Engulfs bacteria **C** Carries oxygen **D** Clots blood

12. A cell 10 µm wide appears 20 mm wide in a photo. The magnification is…
A × 2 **B** × 200 **C** × 2000 **D** × 20 000

A2 Fill in the gaps using words from the word bank. **[10]**

Word bank plasma • haemoglobin • nucleus • antibodies • fibrin • platelets • phagocytes • oxygen • urea • biconcave

The liquid part of the blood is called _____. It carries dissolved substances such as glucose, carbon dioxide and _____. Red blood cells contain a red protein called _____ which joins with _____ in the lungs. Red blood cells have no _____ and are shaped like a _____ disc. White blood cells called _____ engulf pathogens, while lymphocytes make _____. When the skin is cut, _____ help to form a clot made of threads of _____.

A3 True or false? Write T or F. Correct any false statements. **[6]**

Statement	T / F	Correction (if false)
1. Plasma makes up about 55% of the blood.		
2. Platelets are whole cells with a nucleus.		
3. Lymphocytes engulf and digest pathogens.		
4. Oxyhaemoglobin forms in the lungs.		
5. Fibrin is soluble in plasma.		
6. Red blood cells are made in the bone marrow.		

A4 Draw a line to match each component to its function. **[5]**

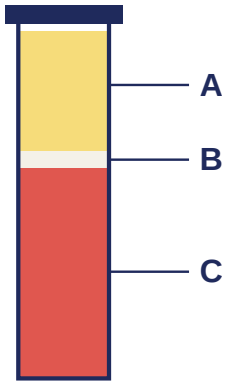
Red blood cell •	• Produces antibodies and antitoxins
Plasma •	• Fragment of a cell that helps blood clot
Phagocyte •	• Carries oxygen bound to haemoglobin
Lymphocyte •	• Liquid that transports dissolved substances
Platelet •	• Engulfs and digests pathogens

Total for this question: _____ / 33

Section B Topic questions [59 marks]

B1 Composition of blood and plasma

A sample of blood was spun in a centrifuge. The diagram shows the result.



Blood after spinning in a centrifuge

(a) Name the parts labelled **A**, **B** and **C**. **[3]**

A ..... B ..... C .....

(b) A blood sample contains 4.5 cm^3 of plasma in a total of 8.0 cm^3. Calculate the percentage of the sample that is plasma. Show your working. **[2]**

.....

.....

percentage = ... %

(c) Plasma is about 90% water. Explain why this is important for its function. **[1]**

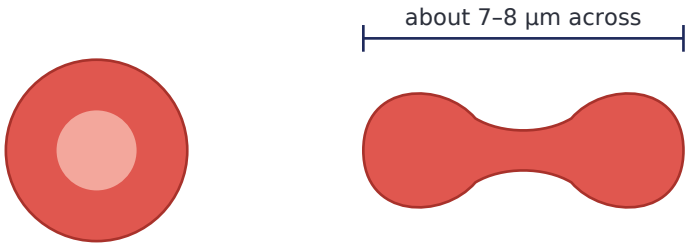
.....

(d) Complete the table to show where substances are transported from and to in the plasma. **[5]**

Substance	Carried from	Carried to
Glucose		All body cells
Carbon dioxide	Respiring cells	
Urea		
Insulin	Pancreas	
Fibrinogen		Stays in the blood

B2 Red blood cells

The diagram shows a red blood cell.



Face view
(pale centre = thinner)

Side view (biconcave)

(a) Name the shape of the red blood cell shown in the side view. **[1]**

.....

(b) Complete the word equations. **[2]**

In the lungs: haemoglobin + ... → .....

In the tissues: oxyhaemoglobin → haemoglobin + oxygen

(c) Explain why having no nucleus is an advantage to a red blood cell. **[2]**

.....

.....

(d) Explain how the shape of a red blood cell helps it to take up oxygen quickly. **[2]**

.....

.....

(e) Suggest **one** disadvantage of a red blood cell having no nucleus. **[1]**

.....

(f) Red blood cells are small and flexible. Explain why this is useful. **[1]**

.....

(g) A lack of iron in the diet can cause anaemia. Explain why a person with anaemia may get tired quickly during exercise. **[3]**

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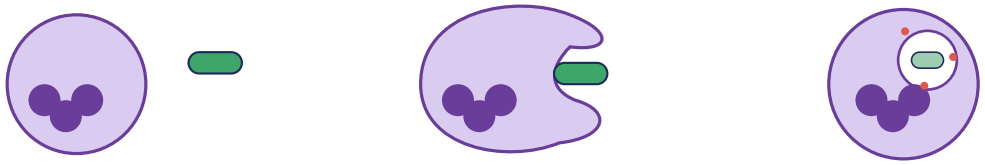
B3 White blood cells

The diagram shows three stages in the action of one type of white blood cell.



Stage 1 Stage 2 Stage 3

(a) Name this type of white blood cell and describe what is happening at each stage. **[3]**

.....

.....

.....

(b) Complete the table to compare the two types of white blood cell. **[4]**

	Phagocyte	Lymphocyte
Shape of nucleus		Large and round
Main function	Engulfs and digests pathogens	
Specific or non-specific?		

(c) Explain why antibodies made against the measles virus do not protect a person against the flu virus. **[2]**

.....

.....

(d) Suggest why the number of white blood cells in the blood often rises during an infection. **[2]**

.....

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(e) Explain how a vaccine can protect a person from a disease in the future. Use the term **memory cells** in your answer. **[3]**

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B4 Platelets and blood clotting

(a) The statements describe how a blood clot forms. They are in the wrong order. Number them 1–6 in the correct order. **[3]**

Statement	Order (1–6)
Fibrin forms a mesh of threads across the wound.	
The clot dries and hardens into a scab.	
Platelets stick to the damaged area and release chemicals.	
Skin and a blood vessel are damaged.	
Red blood cells get trapped in the mesh, forming a clot.	
Soluble fibrinogen is changed into insoluble fibrin.	

(b) Give **two** reasons why it is important for blood to clot quickly after a cut. **[2]**

.....

.....

(c) Explain why it is important that fibrinogen stays soluble while it is in the blood. **[2]**

.....

.....

(d) A person with haemophilia has a tooth removed. Suggest what problem they might have. **[1]**

.....

(e) A blood clot can form inside a coronary artery. Explain why this could cause a heart attack. **[2]**

.....

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B5 Microscopy and data

(a) A lymphocyte has an actual diameter of 10 µm. In a photograph it is 20 mm wide. Calculate the magnification. **[2]**

.....

.....

magnification = × .....

(b) A platelet is drawn 6 mm wide at a magnification of × 2000. Calculate its actual size in µm. **[2]**

.....

.....

actual size = ... µm

(c) A red blood cell 7 µm wide is viewed at × 400. How wide will the image be in mm? **[2]**

.....

.....

image width = ... mm

(d) Convert 0.008 mm into micrometres (µm). **[1]**

..... µm

(e) The table shows the results of a blood test for a patient.

Component	Patient's result	Normal range
Red blood cells (millions per mm^3)	3.2	4.5 – 5.5
White blood cells (per mm^3)	15 000	4000 – 11 000
Platelets (per mm^3)	250 000	150 000 – 400 000

(i) Which component of the patient's blood is within the normal range? **[1]**

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(ii) Suggest a condition the patient may have, based on the red blood cell result. Give a reason. **[2]**

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(iii) Suggest what the white blood cell result shows. Explain your answer. **[2]**

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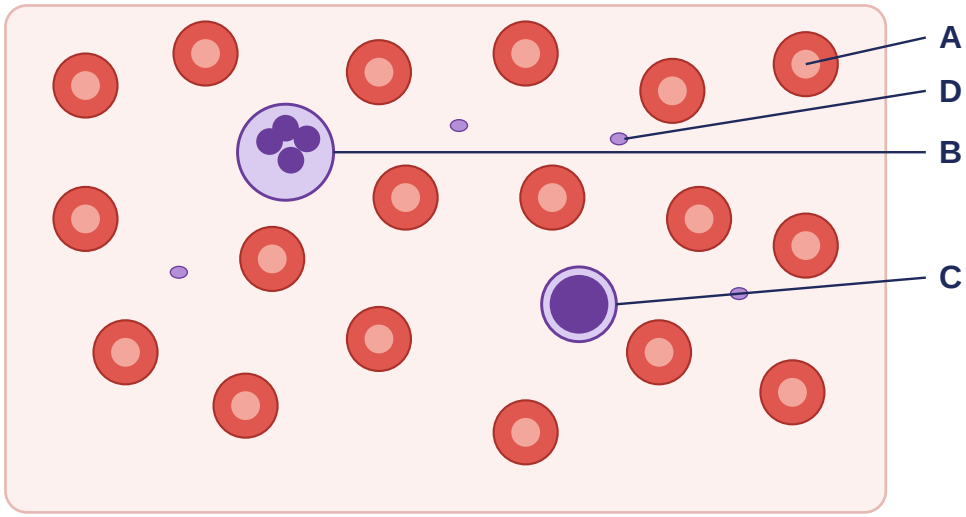
Total for this question: _____ / 59

Section C — Exam-style questions (GCSE / IGCSE) [46 marks]

Answer all questions. Suggested time: 45 minutes.

Question 1 — Cells in a blood smear

The diagram shows cells in a blood smear.



(a) Name the cells labelled **A**, **B**, **C** and **D**. **[4]**

A ..... B .....

C ..... D .....

(b) Give **one** way you can tell from the diagram that cell **B** is a white blood cell and not a red blood cell. **[1]**

.....

(c) Cell **D** is involved in blood clotting. Name the insoluble protein that forms during clotting. **[1]**

.....

Question 2 — Transport in plasma

(a) Blood plasma transports many substances. Complete the table. **[3]**

Substance	Where it is carried from	Where it is carried to
Urea	Liver	
Carbon dioxide		Lungs
	Small intestine	All body cells

(b) Plasma also carries hormones. Name **one** hormone carried in the plasma. **[1]**

.....

Question 3 Red blood cells and oxygen

(a) Red blood cells are adapted to carry oxygen. Describe **two** adaptations of a red blood cell and explain how each one helps it to carry oxygen. **[4]**

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(b) A student draws a red blood cell 28 mm in diameter. The actual diameter of the cell is 7 µm. Calculate the magnification of the drawing. Show your working. **[2]**

.....

.....

magnification = × .....

(c) Iron is needed to make haemoglobin. Explain why a person with too little iron in their diet may feel tired. **[3]**

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Question 4 Defence against pathogens

(a) Describe how a phagocyte destroys a bacterium. **[3]**

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(b) Lymphocytes help to defend the body by producing antibodies and antitoxins. State the difference between the function of an antibody and an antitoxin. **[2]**

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(c) After a person has had chickenpox once, they rarely catch it again. Explain why. **[3]**

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Question 5 Blood clotting

(a) Describe how a blood clot forms after the skin is cut. **[4]**

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(b) Haemophilia is a condition in which blood does not clot properly. Suggest **two** problems a person with haemophilia might have. **[2]**

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Question 6 Living at high altitude

Scientists measured the number of red blood cells in people living at different altitudes.

Altitude (m above sea level)	0	2000	4000	5500
Red blood cells (millions per mm^3)	5.0	5.5	6.1	6.8

(a) Describe the relationship shown in the table. **[1]**

.....

(b) Calculate the percentage increase in red blood cells from 0 m to 4000 m. Give your answer to the nearest whole number. **[2]**

.....

.....

percentage increase = ... %

(c) Explain why the change in red blood cell number is an advantage to people living at high altitude. **[2]**

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(d) Some athletes train at high altitude before a competition at sea level. Suggest why. **[2]**

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Question 7 Extended response

Blood is made of plasma, red blood cells, white blood cells and platelets. Describe the structure and function of each component of blood and explain how the structure of the cells is related to their function. **[6]**

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END OF WORKSHEET **Total: _____ / 138**